DEFINITIONS AND PROPERTIES: Function Inverses

- The **inverse** of a relation in two variables is formed by interchanging the two variables.
- The graph of a relation and the graph of its inverse relation are **reflections** of each other across the line $y = x$.
- If the inverse of function f is also a function, then f is **invertible.**
- If f is invertible and $y = f(x)$, then you can write the inverse of f as $y = f^{-1}(x)$.
- To plot the graph of the inverse of a function, either

  Interchange the variables, solve for y, and plot the resulting equation(s), or

  use parametric mode, as in Example 3.
- If f is invertible, then the compositions of f and f^{-1} are

  $f^{-1}(f(x)) = x$, provided x is in the domain of f and $f(x)$ is in the domain of f^{-1}

  $f(f^{-1}(x)) = x$, provided x is in the domain of f^{-1} and $f^{-1}(x)$ is in the domain of f
- A one-to-one function is invertible. Strictly increasing or strictly decreasing functions are one-to-one functions.

Problem Set 1-5

Reading Analysis

From what you have read in this section, what do you consider to be the main idea? Why is it possible to find the inverse of a function even if the function is not invertible? Under what conditions are you permitted to use the symbol f^{-1} for the inverse of function f? How does the meaning of -1 in the function name f^{-1} differ from the meaning of -1 in a numerical expression such as 7^{-1}?

Quick Review

Q1. In the composite function $m(d(x))$, function d is called the __?__ function.

Q2. In the composite function $m(d(x))$, function m is called the __?__ function.

Q3. Give another symbol for $m(d(x))$.

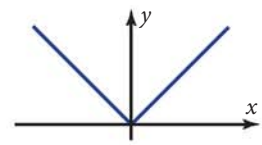
Q4. If $f(x) = 2x$ and $g(x) = x + 3$, find $f(g(1))$.

Q5. Find $g(f(1))$ for the functions in Problem Q4.

Q6. Find $f(f(1))$ for the functions in Problem Q4.

Q7. $|3 - 5| =$ __?__

Q8. Identify the function graphed.



Q9. If $f(x) = 2x$, find $f(0)$.

Q10. If $f(x) = 2x$, find an equation for $g(x)$, a horizontal translation of $f(x)$ by -3 units.

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1. *Punctured Tire Problem:* Suppose that your car runs over a nail. The table shows the pressure y, in pounds per square inch (psi), of the air inside the tire as a function of x, the number of minutes that have elapsed since the nail punctured the tire.